Sample Question Paper 2021-22 Term 1 Subject: Physics (042)

Time: 90 Minutes

Max. Marks 35

**General Instructions:** 

- 1. The Question Paper contains three sections.
- 2. Section A has 25 questions. Attempt any 20 questions.
- 3. Section B has 24 questions. Attempt any20 questions.
- 4. Section C has 6 questions. Attempt any 5 questions.
- 5. All questions carry equal marks.
- 6. There is no negative marking.

### **SECTION A**

This section consists of 25 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

### Q1.Which of the following is NOT the property of equipotential surface?

- (i) They do not cross each other.
- (ii) The rate of change of potential with distance on them is zero.
- (iii) For a uniform electric field they are concentric spheres.
- (iv) They can be imaginary spheres.

#### Q2. Two point charges +8q and -2q are located at x=0 and x=L respectively. The point on x axis at which net electric field is zero due to these charges is-

- (i) 8L
- (ii) **4**L
- (iii) 2 L
- (iv) L

- Q3. An electric dipole of moment p is placed parallel to the uniform electric field. The amount of work done in rotating the dipole by 90° is-
  - (i) 2pE
  - (ii) pE
  - (iii) pE/2
  - (iv) Zero
- Q4. Three capacitors  $2\mu$ F,  $3\mu$ F and  $6\mu$ F are joined in series with each other. The equivalent capacitance is-
  - (i) 1/2µF
  - (ii) 1µF
  - (iii) 2µF
  - (iv) 11µF
- Q5. Two point charges placed in a medium of dielectric constant 5 are at a distance r between them, experience an electrostatic force 'F'. The electrostatic force between them in vacuum at the same distance r will be-
  - (i) 5F
  - (ii) F
  - (iii) F/2
  - (iv) F/5

#### Q6. Which statement is true for Gauss law-

(i) All the charges whether inside or outside the gaussian surface contribute to the electric flux.

- (ii) Electric flux depends upon the geometry of the gaussian surface.
- (iii) Gauss theorem can be applied to non-uniform electric field.

(iv) The electric field over the gaussian surface remains continuous and uniform at every point.

### Q7.A capacitor plates are charged by a battery with 'V' volts. After charging battery is disconnected and a dielectric slab with dielectric constant 'K' is inserted between its plates, the potential across the plates of a capacitor will become

- (i) Zero
- (ii) V/2
- (iii) V/K
- (iv) KV

### Q8. The best instrument for accurate measurement of EMF of a cell is-

- (i) Potentiometer
- (ii) metre bridge
- (iii) Voltmeter
- (iv) ammeter and voltmeter
- Q9.An electric current is passed through a circuit containing two wires of same material, connected in parallel. If the lengths and radii of the wires are in the ratio of 3:2 and 2:3, then the ratio of the current passing through the wire will be
  - (i) 2:3
  - (ii) 3:2
  - (iii) 8:27
  - (iv) 27:8

## Q10.By increasing the temperature, the specific resistance of a conductor and a semiconductor-

- (i) increases for both.
- (ii) decreases for both.
- (iii) increases for a conductor and decreases for a semiconductor.
- (iv) decreases for a conductor and increases for a semiconductor.

### Q11.We use alloys for making standard resistors because they have

- (i) low temperature coefficient of resistivity and high specific resistance
- (ii) high temperature coefficient of resistivity and low specific resistance
- (iii) low temperature coefficient of resistivity and low specific resistance
- (iv) high temperature coefficient of resistivity and high specific resistance
- Q12. A constant voltage is applied between the two ends of a uniform metallic wire, heat 'H' is developed in it. If another wire of the same material, double the radius and twice the length as compared to original wire is used then the heat developed in it will be-
  - (i) H/2
  - (ii) H
  - (iii) 2H
  - (iv) 4H

### Q13.If the potential difference V applied across a conductor is increased to 2V with its temperature kept constant, the drift velocity of the free electrons in a conductor will -

- (i) remain the same.
- become half of its previous value. (ii)
- be double of its initial value. (iii)
- (iv) become zero.

### Q14.The equivalent resistance between A and B is-



- (i) 3 ohms
- (ii) 5.5 ohms
- (iii) 7.5 ohms
- 9.5 ohms (iv)

### Q15. The SI unit of magnetic field intensity is

- (i)  $AmN^{-1}$
- (ii)  $NA^{-1}m^{-1}$
- (iii) NA<sup>-2</sup>m<sup>-2</sup>
- (iv)  $NA^{-1}m^{-2}$

#### Q16.The coil of a moving coil galvanometer is wound over a metal frame in order to

- reduce hysteresis (i)
- (ii) increase sensitivity
- increase moment of inertia (iii)
- provide electromagnetic damping (iv)

#### Q17.Two wires of the same length are shaped into a square of side 'a' and a circle with radius 'r'. If they carry same current, the ratio of their magnetic moment is

- 2:π (i) π :2
- (ii) π:4
- (iii)
- (iv) 4:π

- Q18. The horizontal component of earth's magnetic field at a place is  $\sqrt{3}$  times the vertical component. The angle of dip at that place is
  - (i) π/6
  - (ii) π/3
  - (iii) π/4
  - (iv) 0

# Q19. The small angle between magnetic axis and geographic axis at a place is-

- (i) Magnetic meridian
- (ii) Geographic meridian
- (iii) Magnetic inclination
- (iv) Magnetic Declination

## Q20.Two coils are placed close to each other. The mutual inductance of the pair of coils depends upon the

- (i) rate at which current change in the two coils
- (ii) relative position and orientation of the coils
- (iii) rate at which voltage induced across two coils
- (iv) currents in the two coils
- Q21. A conducting square loop of side 'L' and resistance 'R' moves in its plane with the uniform velocity 'v' perpendicular to one of its sides. A magnetic induction 'B' constant in time and space pointing perpendicular and into the plane of the loop exists everywhere as shown in the figure. The current induced in the loop is  $B \times C \times B$

			_					1
		×	ľ	×	×		×	
(i)	BLv/R Clockwise	×		×	×	<i>v</i>	×	
(ii)	BLv/R Anticlockwise	×		×	×		×	
(iii)	2BL v/B Anticlockwise	×	Ŀ	×	×		×	
()		×	Α	×	×	D	×	

### (iv)Zero

Q22. The magnetic flux linked with the coil (in Weber) is given by theequation –

 $\Phi = 5t^2 + 3t + 16$ 

The induced EMF in the coil at time, t=4 will be-

- (i) -27 V
- (ii) -43 V
- (iii) -108 V
- (iv) 210 V

Q23. Which of the following graphs represent the variation of current(I) with frequency (f) in an AC circuit containing a pure capacitor?



Q24. A 20 volt AC is applied to a circuit consisting of a resistance and a coil with negligible resistance. If the voltage across the resistance is 12 volt, the voltage across the coil is-

- (i) 16 V
- (ii) 10 V
- (iii) 8 V
- (iv) 6 V

Q25. The instantaneous values of emf and the current in a series ac circuit are-

E = Eo Sin  $\omega$ t and I= Io sin( $\omega$ t+ $\pi$ /3) respectively, then it is

- (i) Necessarily a RL circuit
- (ii) Necessarily a RC circuit
- (iii)Necessarily a LCR circuit
- (iv) Can be RC or LCR circuit

#### **SECTION B**

This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

- Q26. A cylinder of radius r and length I is placed in an uniform electric field parallel to the axis of the cylinder. The total flux for the surface of the cylinder is given by-
  - (i) zero
  - (ii)  $\pi r^2$
  - (iii)  $E \pi r^2$
  - (iv) )2 E $\pi$  r<sup>2</sup>

Q27. Two parallel large thin metal sheets have equal surface densities

26.4x10<sup>-12</sup> C/m<sup>2</sup>of opposite signs. The electric field between these sheets is-

- (i) 1.5N/C
- (ii) 1.5 x 10<sup>-16</sup> N/C
- (iii) 3 x 10<sup>-10</sup>N/C
- (iv) 3N/C

## Q28. Consider an uncharged conducting sphere. A positive point charge is placed outside the sphere. The net charge on the sphere is then,

- (i) negative and uniformly distributed over the surface of sphere
- (ii) positive and uniformly distributed over the surface of sphere
- (iii) negative and appears at a point the surface of sphere closest to point charge.
- (iv) Zero

## Q29. Three Charges 2q, -q and -q lie at vertices of a triangle. The value of E and V at centroid of triangle will be-

- (i) E#0 and V#0
- (ii) E=0 and V=0
- (iii) E#0 and V=0
- (iv) E=0 and V#0
- Q30. Two parallel plate capacitors X and Y, have the same area of plates and same separation between plates. X has air and Y with dielectric of constant 2, between its plates. They are connected in series to a battery of 12 V. The ratio of electrostatic energy stored in X and Y is-
- (i) 4:1
- (ii) 1:4
- (iii) 2:1
- (iv) 1:2

## Q31.Which among the following, is not a cause for power loss in a transformer-

- (i) Eddy currents are produced in the soft iron core of a transformer.
- (ii) Electric Flux sharing is not properly done in primary and secondary coils.

- (iii) Humming sound produed in the tranformers due to magnetostriction.
- (iv) Primary coil is made up of a very thick copper wire.

Q32.An alternating voltage source of variable angular frequency 'w' and fixed amplitude 'V' is connected in series with a capacitance C and electric bulb of resistance R(inductance zero). When 'w' is increased-

- (i) The bulb glows dimmer.
- (ii) The bulb glows brighter.
- (iii) Net impedance of the circuit remains unchanged.
- (iv) Total impedance of the circuit increases.
- Q33. A solid spherical conductor has charge +Q and radius R. It is surrounded by a solid spherical shell with charge -Q, innerradius 2R, and outer radius 3R. Which of the following statements is true?



(i)The electric potential has a maximum magnitude at C and the electric field has a maximum magnitude at A

(ii) The electric potential has a maximum magnitude at D and the electric field has a maximum magnitude at B.

(iii) The electric potential at A is zero and the electric field has a maximum magnitude at D.

(iv). Both the electric potential and electric field achieve a maximum magnitude at B.

# Q34. A battery is connected to the conductor of non-uniform cross section area. The quantities or quantity which remains constant is-

- (i) electric field only
- (ii) drift speed and electric field
- (iii)electric field and current

- (iv) current only
- Q35. Three resistors having values  $R_1$ ,  $R_2$ , and  $R_3$  are connected in series to a battery. Suppose  $R_1$  carries a current of 2.0 A,  $R_2$  has a resistance of 3.0 ohms, and  $R_3$  dissipates 6.0 watts of power. Then the voltage across  $R_3$  is-
  - (i) 1V
  - (ii) 2V
  - (iii) 3V
  - (iv) 4V
- Q36.A straight line plot showing the terminal potential difference (V) of a cell as a function of current (I) drawn from it, is shown in the figure. The internal resistance of the cell would be then-
- (i) 2.8 ohms
- (ii) 1.4 ohms
- (iii) 1.2 ohms
- (iv) zero



Q37. A 10 m long wire of uniform cross-section and 20  $\Omega$  resistance is used in a potentiometer. The wire is connected in series with a battery of 5 V along with an external resistance of 480  $\Omega$ . If an unknown emf E is balanced at 6.0 m length of the wire, then the value of unknown emf is-



- (i) 1.2 V
- (ii) 1.02 V
- (iii) 0.2 V

- (iv) 0.12 V
- Q38.The current sensitivity of a galvanometer increases by 20%. If its resistance also increases by 25%, the voltage sensitivity will
  - (i) decrease by 1%
  - (ii) increased by 5%
  - (iii) increased by 10%
  - (iv ) decrease by 4%
- Q39. Three infinitely long parallel straight current carrying wires A, B and C are kept at equal distance from each other as shown in the figure. The wire C experiences net force F. The net force on wire C, when the current in wire A is reversed will be



- Q40. In a hydrogen atom the electron moves in an orbit of radius 0.5 A<sup>o</sup> making 10 revolutions per second, the magnetic moment associated with the orbital motion of the electron will be
  - (i) 2.512 x 10<sup>-38</sup> Am<sup>2</sup>
  - (ii) 1.256 x 10<sup>-38</sup> Am<sup>2</sup>
  - (iii) 0.628 X10<sup>-38</sup> Am<sup>2</sup>
  - (iv) zero
- Q41. An air-cored solenoid with length 30 cm, area of cross-section 25 cm<sup>2</sup> and number of turns 800, carries a current of 2.5 A. The current is suddenly switched off in a brief time of 10<sup>-3</sup>s. Ignoring the variation in magnetic field near the ends of the solenoid, the average back emf induced across the ends of the open switch in the circuit would be

(i) zero

(ii)3.125 volts

(iii) 6.54 volts

(iv) 16.74 volts

- Q42. A sinusoidal voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in which R = 3  $\Omega$ , L = 25.48 mH, and C = 796  $\mu$ F, then the power dissipated at the resonant condition will be-
  - (i)39.70 kW
  - (ii) 26.70 kW
  - (iii)13.35 kW
  - (iv)Zero
- Q43. A circular loop of radius 0.3cm lies parallel to much bigger circular of radius 20 cm. The centre of the small loop is on the axis of the bigger loop. The distance between their centres is 15 cm. If a current of 2.0 A flows through the smaller loop, then the flux linked with the bigger loop is
  - (i) 3.3 X 10<sup>-11</sup> weber
  - (ii) 6 X 10<sup>-11</sup>weber
  - (iii) 6.6 X 10<sup>-9</sup>weber
  - (iv) 9.1 X 10<sup>-11</sup> weber

## Q44.If both the number of turns and core length of an inductor is doubled keeping other factorsconstant, then its self-inductance will be-

(i) Unaffected(ii) doubled(iii) halved(iv) quadrupled

# 45. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): To increase the range of an ammeter, we must connect

a suitable high resistance in series to it.

**Reason (R):** The ammeter with increased range should have high resistance.

Select the most appropriate answer from the options given below:

- (i) Both A and R are true and R is the correct explanation of A
- (ii) Both A and R are true but R is not the correct explanation of A.
- (iii)A is true but R is false.
- (iv) A is false and R is also false.
- 46. Given below are two statements labelled as Assertion (A) and Reason (R)
- **Assertion (A)**: An electron has a high potential energy when it is at a location associated with a more negative value of potential, and a low potential energy when at a location associated with a more positive potential.
- Reason (R):Electrons move from a region of higher potential to region of lower potential.

Select the most appropriate answer from the options given below:

- (i) Both A and R are true and R is the correct explanation of A
- (ii) Both A and R are true but R is not the correct explanation of A.
- (iii)A is true but R is false.
- (iv) A is false and R is also false.
- 47. Given below are two statements labelled as Assertion (A) and Reason (R)
- Assertion(A): A magnetic needle free to rotate in a vertical plane, orients itself (with its axis) vertical at the poles of the earth.
- **Reason (R):** At the poles of the earth the horizontal component of earth's magnetic field will be zero.
- Select the most appropriate answer from the options given below:
- (i) Both A and R are true and R is the correct explanation of A
- (ii) Both A and R are true but R is not the correct explanation of A.
- (iii)A is true but R is false.
- (iv) A is false and R is also false.
- 48. Given below are two statements labelled as Assertion (A) and Reason (R)

**Assertion(A):** A proton and an electron, with same momenta, enter in a magnetic field in a direction at right angles to the lines of the force. The radius of the paths followed by them will be same.

Reason(R): Electron has less mass than the proton.

Select the most appropriate answer from the options given below:

- (i) Both A and R are true and R is the correct explanation of A
- (ii) Both A and R are true but R is not the correct explanation of A.
- (iii)A is true but R is false.
- (iv) A is false and R is also false.
- 49. Given below are two statements labelled as Assertion (A) and Reason (R)
- Assertion (A):On Increasing the current sensitivity of a galvanometer by increasing the number of turns, may not necessarily increase its voltage sensitivity.
- **Reason(R):** The resistance of the coil of the galvanometer increases on increasing the number of turns.

Select the most appropriate answer from the options given below:

- (i) Both A and R are true and R is the correct explanation of A
- (ii) Both A and R are true but R is not the correct explanation of A.
- (iii)A is true but R is false.

(iv) A is false and R is also false.

### SECTION C

This section consists of 6 multiple choice questions with an overall choice to attempt any 5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

Q50. A small object with charge q and weight mg is attached to one end of a string of length 'L' attached to a stationary support. The system is placed in a uniform horizontal electric field 'E', as shown in the accompanying figure. In the presence of the field, the string makes a constant angle  $\theta$  with the vertical. The sign and magnitude of q-

(i) positive with magnitude mg/E

(ii) positive with magnitude  $(mg/E)tan\theta$ 



- (iii) negative with magnitude mg/E tan $\theta$
- (iv) positive with magnitude E  $\tan\theta/mg$
- Q51.A free electron and a free proton are placed between two oppositely charged parallel plates. Both are closer to the positive plate than the negative plate.



#### Which of the following statements is true?

- I. The force on the proton is greater than the force on the electron.
- II. The potential energy of the proton is greater than that of the electron.
- III. The potential energy of the proton and the electron is the same.

(i) I only

- (ii) II only
- (iii) III and I only
- (iv)II and I only

Case study : Read the following paragraph and answers the questions:



The large-scale transmission and distribution of electrical energy over long distances is done with the use of transformers. The voltage output of the generator is stepped-up. It is then transmitted over long distances to an area sub-station near the consumers. There the voltage is stepped down. It is further stepped down at distributing sub-stations and utility poles before a power supply of 240 V reaches our homes.

### Q52. Which of the following statement is true?

- (i) Energy is created when a transformer steps up the voltage
- (ii) A transformer is designed to convert an AC voltage to DC voltage
- (iii) Step-up transformer increases the power for transmission
- (iv) Step-down transformer decreases the AC voltage

### Q53. If the secondary coil has a greater number of turns than the primary,

(i) the voltage is stepped-up (Vs > Vp ) and arrangement is called a step-up transformer

(ii) the voltage is stepped-down (Vs  ${<}\mbox{Vp}$  ) and arrangement is called a step-down transformer

(iii) the current is stepped-up (Is > Ip ) and arrangement is called a step-up transformer

(iv) the current is stepped-down (Is  ${\sf <Ip}$  ) and arrangement is called a step-down transformer

### Q54. We need to step-up the voltage for power transmission, so that

- (i) the current is reduced and consequently, the I<sup>2</sup>R loss is cut down
- (ii) the voltage is increased , the power losses are also increased
- (iii) the power is increased before transmission is done
- (iv) the voltage is decreased so V<sup>2</sup>/R losses are reduced
- Q55. A power transmission line feeds input power at 2300 V to a step down transformer with its primary windings having 4000 turns. The number of turns in the secondary in order to get output power at 230 V are
  - (i) 4
  - (ii) 40
  - (iii) 400
  - (iv) 4000

### Sample Question Paper 2021-22 Term 1 Subject: Chemistry (043)

Time: 90 Minutes

Max. Marks: 35

General Instructions:

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- 2. Section A has 25 questions. Attempt any 20 questions.
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### SECTION A

This section consists of 25multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

1.Which of the following statements is true:
(a)Melting point of Phosphorous is less than that of Nitrogen
(b)N<sub>2</sub> is highly reactive while P<sub>4</sub> is inert
(c)Nitrogen shows higher tendency of catenation than P
(d)N-N is weaker than P-P

2. Which of the following is a non-stoichiometric defect?
(a)Frenkel defect
(b)Schottky defect
(c)metal deficiency defect
(d)interstitial defect

3. Identify the law which is stated as:
"For any solution, the partial vapour pressure of each volatile component in the solution is directly proportional to its mole fraction."
(a)Henry's law
(b) Raoult's law
(c)Dalton's law
(d)Gay-Lussac's Law

- 4. Pink colour of LiCl crystals is due to:
- (a) Schottky defect
- (b)Frenkel defect
- (c) Metal excess defect
- (d) Metal deficiency defect

### 5. Which of the following isomer has the highest meltingpoint:

- (a) 1,2-dicholorbenzene
- (b) 1,3 -dichlorobenzene
- (c) 1,4-dicholorbenzene
- (d) all isomers have same melting points
- 6. Which one of the following reactions is not explained by the open chain Structure of glucose:
- (a) Formation of pentaacetate of glucose with acetic anhydride.
- (b) formation of addition product with 2,4 DNP reagent
- (c) Silver mirror formation with Tollen's reagent
- (d) existence of alpha and beta forms of glucose.

7. Williamson's synthesis of preparing dimethyl ether is an:

- (a)  $S_N^{1}$  reaction
- (b) Elimination reaction
- (c)  $S_N^2$  reaction
- (d) Nucleophilic addition reaction

8. Chlorine water loses its yellow colour on standing because:

- (a) HCl gas is produced, due to the action of sunlight.
- (b) a mixture of HOCl and HCl is produced in the presence of light
- (c) HOCl and hydrogen gas is produced
- (d) a mixture of HCl and ClO<sub>3</sub> is produced, due to the action of sunlight

9. During dehydration of alcohols to alkenes by heating with concentrated  $H_2SO_4$ , the initiation step is:

- (a) protonation of alcohol molecule
- (b) formation of carbocation
- (c) elimination of water
- (d) formation of an ester
- 10. Amorphous solids are:
- (a) isotropic
- (b)anisotropic
- (c) isotopic
- (d) isomeric

### 11. Which of the following reactions is used to prepare salicylaldehyde?

- (a) Kolbe's reaction
- (b) Etard reaction
- (c) Reimer- Tiemann reaction
- (d) Stephen's reduction.

12. Which of the following is an example of a solid solution?

(a)sea water

(b)sugar solution

(c)smoke

(d)22 carat gold

13. The boiling points of alcohols are higher than those of hydrocarbons of comparable masses due to:

(a) Hydrogen bonding

(b) Ion – dipole interaction

(c) Dipole- dipole interaction

(d) Van der Waal's forces.

14. Which of the following has the lowest boiling point:

(a)H<sub>2</sub>O

 $(b)H_2S$ 

(c)H<sub>2</sub>Se

(d)H<sub>2</sub>Te

15. Which of the following statement is correct:

(a)Fibrous proteins are generally soluble in water

(b)Albumin is an example of fibrous proteins

(c)In fibrous proteins, the structure is stabilised by hydrogen bonds and disulphide bonds

(d)pH does not affect the primary structure of protein.

16. Major product obtained on reaction of 3-Phenyl propene with HBr in presence of organic peroxide

(a)3- Phenyl 1- bromopropane

(b) 1 –Phenyl -3- bromopropane

(c) 1-Phenyl -2-bromopropane

(d) 3-Phenyl -2- bromopropane

17. Which of the following is a correct statement for  $C_2H_5Br$ ?

(a) It reacts with metallic Na to give ethane.

(b) It gives nitroethane on heating with aqueous solution of AgNO<sub>2</sub>

(c) It gives C<sub>2</sub>H<sub>5</sub>OH on boiling with alcoholic potash.

(d) It forms diethylthioether on heating with alcoholic KSH.

18. Covalency of nitrogen is restricted to:

(a)2

(b)3

(c)4

(d)5

19. Solubility of gases in liquids decreases with rise in temperature because dissolution is an:

(a)endothermic and reversible process

(b)exothermic and reversible process

(c)endothermic and irreversible process

(d) exothermic and irreversible process

20.All elements of Group 15 show allotropy except:(a)Nitrogen(b)Arsenic(c)Antimony(d)Bismuth

21.Which of the following is a polysaccharide?(a)glucose(b)maltose(c)glycogen(d)lactose

22. Substance having the lowest boiling point:(a)Hydrogen(b)Oxygen(c)Nitrogen(d) Helium

23.Lower molecular mass alcohols are:

(a)miscible in limited amount of water

(b) miscible in excess of water

(c) miscible in water in all proportions

(d) immiscible in water

24. Maximum oxidation state exhibited by Chlorine is:

(a) +1

(b) +3

(c)+5

(d)+7

25.In which of the following cases blood cells will shrink:

(a)when placed in water containing more than 0.9% (mass/ volume) NaCl solution.

(b)when placed in water containing less than 0.9% (mass /volume) NaCl solution.

(c)when placed in water containing 0.9% (mass/volume) NaCl solution.

(d)when placed in distilled water.

#### **SECTION B**

This section consists of 24multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

26. How much ethyl alcohol must be added to 1 litre of water so that the solution will freeze at- 14°C ? ( $K_f$  for water = 1.86°C/mol) (a) 7.5 mol (b)8.5 mol (c)9.5 mol (d)10.5 mol 27. Which reagents are required for one step conversion of chlorobenzene to toluene?
(a) CH<sub>3</sub>Cl / AlCl<sub>3</sub>
(b) CH<sub>3</sub>Cl, Na, Dry ether
(c)CH<sub>3</sub>Cl/Fe dark
(d) NaNO<sub>2</sub>/ HCl /0-5<sup>0</sup>C

28. On partial hydrolysis, XeF<sub>6</sub> gives:

(a)  $XeO_3 + 4HF$ 

(b)  $XeO_2F + HF$ 

(c) XeOF<sub>4</sub>+ H<sub>2</sub>

(d)  $XeO_2F_2 + 4HF$ 

29. Which one of the following statement is correct about sucrose :

(a) It can reduce tollen's reagent however cannot reduce fehling's reagent

(b) It undergoes mutarotation like glucose and fructose

(c) It undergoes inversion in the configuration on hydrolysis

(d) It is laevorotatory in nature .

30. Phenol does not undergo nucleophilic substitution reaction easily due to:

(a) acidic nature of phenol

(b) partial double bond character of C-OH bond

(c) partial double bond character of C-C bond

(d)instability of phenoxide ion

31. Which of the following has highest ionisation enthalpy?

(a)Nitrogen

(b)Phosphorus

(c)Oxygen

(d)Sulphur

32. Metal M ions form accp structure. Oxide ions occupy  $\frac{1}{2}$  octahedral and  $\frac{1}{2}$  tetrahedral voids. What is the formula of the oxide?

(a)MO

 $(b)MO_2$ 

 $(c)MO_3$ 

(d)  $M_2O_3$ 

33. The reaction of toluene with  $Cl_2$  in presence of  $FeCl_3$  gives 'X' while the f toluene with  $Cl_2$  in presence of light gives 'Y'. Thus 'X' and 'Y'are:

(a) X = benzyl chloride Y = o and p - chlorotoluene

(b) X = m - chlorotoluene Y = p - chlorotoluene

(c) X = 0 and p-chlorotoluene Y = trichloromethylbenzene

(d) X= benzyl chloride, Y = m-chlorotoluene

34.Ozone is a/ an \_\_\_\_\_ molecule and the two O-O bond lengths

in ozone are (i)\_\_\_\_\_-and (ii) \_\_\_\_\_

(a) linear ,110pm ; 148pm

(b) angular, 110pm; 148pm

(c)linear, 128pm ; 128pm

(d)angular, 128pm ; 128pm

35. Water retention or puffiness due to high salt intake occurs due to:

(a)diffusion

(b)vapour pressure difference

(c) osmosis

(d)reverse osmosis

36. In the following reaction, identify A and B:

$$\begin{array}{c|c} C_6H_{12}O_6 & \text{Acetic anhydride} & A \\ & & & \\ &$$

В

```
(a) A = COOH-(CH_2)_4 -COOH, B = OHC-(CHOCOCH_3)_4 -CH<sub>2</sub>OCOCH<sub>3</sub>
```

(b) A= COOH-(CH<sub>2</sub>)<sub>4</sub> -CHO , B= OHC-(CHOCOCH<sub>3</sub>)<sub>4</sub> -CH<sub>2</sub>OCOCH<sub>3</sub>

(c)  $A = OHC-(CHOCOCH_3)_3-CH_2OCOCH_3 B = COOH-(CH_2)_4 -CHO$ ,

```
(d) A = OHC-(CHOCOCH_3)_4-CH_2OCOCH_3 B = COOH-(CH_2)_4 -COOH
```

37. In lake test for Al<sup>3+</sup> ions, there is the formation of coloured 'floating lake'. It is due to: (a)Absorption of litmus by [Al(OH)<sub>4</sub>]<sup>-</sup>
(b)Absorption of litmus by Al(OH)<sub>3</sub>
(c)Adsorption of litmus by [Al(OH)<sub>4</sub>]<sup>-</sup>
(d) Adsorption of litmus by Al(OH)<sub>3</sub>

38. A unit cell of NaCl has 4 formula units. Its edge length is 0.50 nm. Calculate the density if molar mass of NaCl = 58.5 g/mol.
(a) 1 g/cm<sup>3</sup>
(b)2 g/cm<sup>3</sup>

(c)  $3 \text{ g/cm}^3$ (d) $4 \text{g/cm}^3$ 

39. Which one of the following are correctly arranged on the basis of the property indicated:

(a) $I_2 < Br_2 < F_2 < Cl_2$  [increasing bond dissociation enthalpy]

(b)  $H_2O > H_2S < H_2Te < H_2Se$  [increasing acidic strength]

(c)  $NH_3 < N_2O < NH_2OH < N_2O_5$  [increasing oxidation state]

(d) BiH<sub>3</sub><SbH<sub>3</sub><AsH<sub>3</sub><PH<sub>3</sub><NH<sub>3</sub> [ increasing bondangle]

40. What would be the reactant and reagent used to obtain 2, 4-dimethyl pentan-3-ol?

- (a) Propanal and propyl magnesium bromide
- (b) 3-methylbutanal and 2-methyl magnesium iodide
- (c) 2-dimethylpropanone and methyl magnesium iodide
- (d) 2- methylpropanal and isopropyl magnesium iodide

41. o-hydroxy benzyl alcohol when reacted with PCl<sub>3</sub> gives the product as (IUPAC name)

- (a) o- hydroxy benzyl chloride
- (b) 2- chloromethylphenol
- (c) o-chloromethylchlorobenzene
- (d) 4-hydroxymethylphenol

42. Which of the following statements is true:

(a)Ammonia is the weakest reducing agent and the strongest base among Group 15 hydrides.

(b) Ammonia is the strongest reducing agent as well as the strongest base among Group 15 hydrides.

(c)Ammonia is the weakest reducing agent as well as the weakest base among Group 15 hydrides.

(d) Ammonia is the strongest reducing agent and the weakest base among Group 15 hydrides.

43.Identify the secondary alcohols from the following set:



(iv)

 $\cap \square$ 

(a)(i) and (iv) (b)(i) and (iii) (c)(i) and (ii) (d)(i), (iii) and (iv)

44.Alkenes decolourise bromine water in presence of CCl<sub>4</sub> due to formation of:
(a)allyl bromide
(b)vinyl bromide
(c)bromoform
(d)vicinal dibromide

45. Given below are two statements labelled as Assertion (A) and Reason (R) Assertion (A): Electron gain enthalpy of oxygen is less than that of Flourine but greater than Nitrogen.

**Reason (R):** Ionisation enthalpies of the elements follow the order Nitrogen > Oxygen > Fluorine

Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A.

(c)A is true but R is false.

(d) A is false but R is true.

46. Given below are two statements labelled as Assertion (A) and Reason (R) **Assertion (A):** Alkyl halides are insoluble in water.

**Reason** (**R**): Alkyl halides have halogen attached to sp<sup>3</sup> hybrid carbon.

Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A.

(c)A is true but R is false.

(d) A is false but R is true.

47. Given below are two statements labelled as Assertion (A) and Reason (R) **Assertion(A):** Molarity of a solution changes with temperature.

**Reason** (**R**): Molarity is a colligative property.

Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A.

(c)A is true but R is false.

(d) A is false but R is true.

48. Given below are two statements labelled as Assertion (A) and Reason (R) **Assertion(A):SO**<sub>2</sub> is reducing while TeO<sub>2</sub> is an oxidising agent.

Reason(R):Reducing property of dioxide decreases from SO<sub>2</sub> to TeO<sub>2</sub>.

Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A.

(c)A is true but R is false.

(d) A is false but R is true.

49.Given below are two statements labelled as Assertion (A) and Reason (R) **Assertion (A):**Cryoscopic constant depends on nature of solvent.

Reason(R):Cryoscopic constant is a universal constant.

Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A.

(c)A is true but R is false.

(d) A is false but R is true.

#### SECTION C

This section consists of 6multiple choice questions with an overall choice to attempt any**5.** In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

50.Match the following:

Ι	Π
(i)Amino acids	(A)protein
(ii)Thymine	(B)Nucleic acid
(iii)Insulin	( C)DNA
(iv)phosphodiester linkage	(D)Zwitter ion
(v) Uracil	

Which of the following is the best matched options?

- (a) i-A, v- D, iii- C, iv-B
- (b) i-D, ii-C, iii- A, iv-B
- (c) i-D, v- D, iii- A, iv-B
- (d) i-A, ii- C, iii- D, iv-B
- 51. Which of the following analogies is correct:

(a)Nitrogen:  $1s^22s^22p^3$  :: Argon:  $1s^22s^22p^6$ 

(b)Carbon: maximum compounds :: Xenon: no compounds

(c) XeF<sub>2</sub>: Linear :: ClF<sub>3</sub>: Trigonal planar

(d)Helium: meteorological observations:: Argon: metallurgical processes

52. Complete the following analogy:

Same molecular formula but different structures: A:: Non superimposable mirror images: B

- (a) A:Isomers B: Enantiomer
- (b) A: Enantiomers B: Racemic mixture
- (c) A: Sterioisomers B: Retention

(d) A: IsomersB: Sterioisomers

#### CASE1: Read the passage given below and answer the following questions 53-55

Early crystallographers had trouble solving the structures of inorganic solids using X-ray diffraction because some of the mathematical tools for analyzing the data had not yet been developed. Once a trial structure was proposed, it was relatively easy to calculate the diffraction pattern, but it was difficult to go the other way (from the diffraction pattern to the structure) if nothing was known *a priori* about the arrangement of atoms in the unit cell. It was important to develop some guidelines for guessing the coordination numbers and bonding geometries of atoms in crystals. The first such rules were proposed by Linus Pauling, who considered how one might pack together oppositely charged spheres of different radii. Pauling proposed from geometric considerations that the quality of the "fit" depended on the **radius ratio** of the anion and the cation.

If the anion is considered as the packing atom in the crystal, then the smaller cation fills interstitial sites ("holes"). Cations will find arrangements in which they can contact the largest number of anions. If the cation can touch all of its nearest neighbour anions then the fit is good. If the cation is too small for a given site, that coordination number will be unstable and it will prefer a lower coordination structure. The table below gives the ranges of cation/anion radius ratios that give the best fit for a given coordination geometry.

Coordination	Geometry	$ ho = r_{\text{cation}}/r_{\text{anion}}$
number		
2	linear	0 - 0.155
3	triangular	0.155 - 0.225
4	tetrahedral	0.225 - 0.414
4	square planar	0.414 - 0.732
6	octahedral	0.414 - 0.732
8	cubic	0.732 - 1.0
12	cuboctahedral	1.0

(Source: Ionic Radii and Radius Ratios. (2021, June 8). Retrieved June 29, 2021, from <u>https://chem.libretexts.org/@go/page/183346</u>)

Q53. The radius of  $Ag^+$  ion is 126pm and of I<sup>-</sup> ion is 216pm. The coordination number of  $Ag^+$  ion is:

(a)2

(b)3

(c)6

(d)8

Q54. A solid AB has square planar structure. If the radius of cation  $A^+$  is 120pm, calculate the maximum possible value of anion B

(a)240 pm

(b)270 pm

(c)280 pm

(d)290 pm

Q55.A "good fit" is considered to be one where the cation can touch:

(a) all of its nearest neighbour anions.

(b) most of its nearest neighbour anions.

(c) some of its nearest neighbour anions.

(d) none of its nearest neighbour anions.

### Sample Question Paper CLASS: XII Session: 2021-22 Mathematics (Code-041) Term - 1

Time Allowed: 90 minutes

Maximum Marks: 40

General Instructions:

- 1. This question paper contains three sections A, B and C. Each part is compulsory.
- 2. Section A has 20 MCQs, attempt any 16 out of 20.
- 3. Section B has 20 MCQs, attempt any 16 out of 20
- 4. Section C has 10 MCQs, attempt any 8 out of 10.
- 5. All questions carry equal marks.
- 6. There is no negative marking.

### SECTION – A

In this section, attempt any 16 questions out of Questions 1 – 20. Each Question is of 1 mark weightage.

1.	$\frac{\sin \left[\frac{\pi}{3} - \sin^{-1} \left(-\frac{1}{2}\right)\right] \text{ is equal to:}}{\begin{vmatrix} a \\ 2 \\ c \\ c \end{vmatrix} - 1 \qquad \qquad b) \frac{1}{3} \qquad \qquad b) \frac{1}{3}$	1
2.	The value of k (k < 0) for which the function f defined as $f(x) = \begin{cases} \frac{1-\cos kx}{x \sin x}, & x \neq 0 \\ \frac{1}{2}, & x = 0 \\ \text{is continuous at } x = 0 \text{ is:} \end{cases}$	1
	$\begin{array}{c c} a) \pm 1 & b) = 1 \\ \hline c) \pm \frac{1}{2} & d) \frac{1}{2} \end{array}$	
3.	If A = $[a_{ij}]$ is a square matrix of order 2 such that $a_{ij} = \begin{cases} 1, when i \neq j \\ 0, when i = j \end{cases}$ , then A <sup>2</sup> is:	1
	a) $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$ b) $\begin{vmatrix} 1 & 1 \\ 0 & 0 \end{vmatrix}$	
	c) $\begin{vmatrix} 1 & 1 \\ 1 & 0 \end{vmatrix}$ d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$	
4.	Value of k, for which A = $\begin{bmatrix} k & 8 \\ 4 & 2k \end{bmatrix}$ is a singular matrix is:	1
	a) 4     b) -4       c) ±4     d) 0	

5.	Find the intervals in which the function f given by $f(x) = x^2 - 4x + 6$ is strictly increasing:				
	a) $(-\infty, 2) \cup (2, \infty)$	b) $(2, \infty)$			
	C) (−∞, 2)	d) (−∞, 2]U (2, ∞)			
6.	Given that A is a square matrix of	of order 3 and $ A  = -4$ , then $ a $	dj A   is	1	
	equal to:				
	a) -4	b) 4			
	c) -16	d) 16			
7.	A relation R in set A = $\{1,2,3\}$ is	defined as $R = \{(1, 1), (1, 2), (2, \dots)\}$	2), (3, 3)}.	1	
	Which of the following ordered p	pair in R shall be removed to mak	e it an		
	equivalence relation in A?				
	(1, 1)	b) (1.2)	1		
	$\begin{array}{c c} a & (1, 1) \\ \hline c & (2, 2) \end{array}$	d) (3, 3)			
8.	$\left[ \int \frac{2a+b}{a-2b} \right] = \left[ \begin{array}{c} 4 & -3 \end{array} \right]$	then value of $a + b - c + 2d$ is:	-	1	
	$\begin{bmatrix} 1 & 1 \\ 5c & -d & 4c + 3d \end{bmatrix} \begin{bmatrix} 11 & 24 \end{bmatrix}$				
	a) 8	b) 10	]		
	c) 4	d) -8	]		
9.	The point at which the normal to	the curve $v = x + \frac{1}{x}$ , $x > 0$ is performed	pendicular to	1	
	the line $3x - 4y - 7 = 0$ is:	<i>x</i> '			
		-	_		
	a) (2, 5/2)	b) (±2, 5/2)			
10	(-1/2, 5/2) sin (tan <sup>-1</sup> x) where $ x  < 1$ is equ	d) (1/2, 5/2)		1	
10.				I	
	a) $\frac{x}{\sqrt{1-x^2}}$	b) $\frac{1}{\sqrt{2}}$			
	v1-x-	$\sqrt{1-x^2}$			
	C) $\frac{1}{\sqrt{1+r^2}}$	d) $\frac{x}{\sqrt{1+x^2}}$			
	VITA				
11.	Let the relation R in the set $A = \{$	$\{x \in Z : 0 \le x \le 12\}$ , given by R =	{(a, b) :  a –	1	
		le equivalence class containing i	, 15.		
	a) {1, 5, 9}	b) {0, 1, 2, 5}			
	с) <i>ф</i>	d) A			
12.	If $e^x + e^y = e^{x+y}$ then $\frac{dy}{dy}$ is:			1	
	dx				
	a) e <sup>y - x</sup>	b) e <sup>x + y</sup>	]		
	c) – e <sup>y-x</sup>	d) 2 e <sup>x-y</sup>	]		
1					

13.	Given that matrices A and B are of order 3×n and m×5 respectively, then the				
	order of matrix $C = 5A + 3B$ is:				
	a) 3×5	b) 5×3			
	C) 3×3	d) 5×5			
14.	If y = 5 cos x - 3 sin x, then $\frac{d^2y}{dx^2}$ i	s equal to:	1		
	a) - y	b) y			
	C) 23y	u) 9y			
15.	For matrix A = $\begin{bmatrix} 2 & 5 \\ -11 & 7 \end{bmatrix}$ , $(adjA)'$	is equal to:	1		
	a) $\begin{bmatrix} -2 & -5 \end{bmatrix}$	b) $\begin{bmatrix} 7 & 5 \end{bmatrix}$			
		<sup>5</sup> , [11 2]			
	-> [7 11]				
	$\begin{bmatrix} 2 \\ -5 \\ 2 \end{bmatrix}$	$[11 \ 2]$			
10			4		
16.	The points on the curve $\frac{x^2}{9} + \frac{y^2}{16} =$	= 1 at which the tangents are parallel to y-	1		
	axis are:				
	a) $(0,\pm 4)$	b) (±4,0)			
47	$(-c)$ $(\pm 3,0)$	d) $(0, \pm 3)$			
17.	Given that $A = [a_{ij}]$ is a square r	natrix of order 3×3 and $ A  = -7$ , then the	1		
	value of $\sum_{i=1}^{3} a_{i2}A_{i2}$ , where $A_{ij}$ de	enotes the cofactor of element $a_{ij}$ is:			
		b) 7			
		d) 40			
18	( y ) = ( y )	u) 49	1		
10.	If $y = \log(\cos e^{x})$ , then $\frac{1}{dx}$ is:		I		
	a) $\cos e^{x-1}$	b) $e^{-x}\cos e^x$			
10	C) $e^x \sin e^x$	d) $-e^x \tan e^x$			
19.	Based on the given shaded region	on as the feasible region in the graph, at	1		
	which point(s) is the objective ful	z = 5x + 9y maximum?			
	Y N Z				
	+				
	25 D(0,20)				
	15-A C(15,15)				
	(0,10) 5 B(5.5) (6)	0.0)			
	X' 9 5 1 20 25 50	X X			
		x + 3y = 60			
	(10,0) $\lambda = x + y = 10$	<i>x</i> · <i>by</i> · 00			
	a) Point B	b) Point C			
	c) Point D	d) every point on the line			
		segment CD			

20.	The least value of the function $f(x) = 2cosx + x$ in the closed interval $[0, \frac{\pi}{2}]$		
	is:	-	
	a) 2	b) $\frac{\pi}{2} + \sqrt{3}$	
	$\frac{1}{c}$	d) The least value does not	
	, 2 , 2	exist.	
	<u>SE</u> In this section, attempt any 16 Each Questior	ECTION – B o questions out of the Questions 21 - 40. In is of 1 mark weightage.	
21.	The function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined as	$f(x) = x^3$ is:	1
	a) One-on but not onto	b) Not one-one but onto	
	c) Neither one-one nor onto	d) One-one and onto	
22.	If $x = a \sec \theta$ , $y = b \tan \theta$ , then $\frac{d^2}{dx}$	$\frac{y}{2}$ at $\theta = \frac{\pi}{6}$ is:	1
	(a) $\frac{-3\sqrt{3}b}{2}$	b) $\frac{-2\sqrt{3}b}{3}$	
	$\frac{a^2}{a^2}$	a	
	c) - a	$a_{j} \frac{1}{3\sqrt{3}a^2}$	
23.	(0, 8) (0, 8) (0, 0) (0, 0) (0) (0, 0) (0, 0) (0, 0) (0, 0) (0, 0) (0, 0) (0, 0) (0, 0) (0, 0	ven graph, the feasible region for a LPP is ective function Z = $2x - 3y$ , will be minimum b) (6, 8) d) (6, 5)	1
24.	The derivative of sin <sup>-1</sup> $(2x\sqrt{1-x^2})$ a) 2 by c) $\frac{\pi}{2}$ dy	$\frac{1}{\sqrt{2}}$ w.r.t sin <sup>-1</sup> x, $-\frac{1}{\sqrt{2}} < x < \frac{1}{\sqrt{2}}$ , is: $\frac{1}{\sqrt{2}} - 2$	1
25.			1
	If A = $\begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} 2 \\ -4 \\ 2 \end{bmatrix}$	$\begin{bmatrix} 2 & -4 \\ 2 & -4 \\ -1 & 5 \end{bmatrix}$ , then:	
	a) $A^{-1} = B$	b) $A^{-1} = 6B$	
	C) B'=B	d) $B^{-1} = \frac{1}{6}A$	

26.	The real function $f(x) = 2x^3 - 3x^2 - 36x + 7$ is:	1		
	a) Strictly increasing in $(-\infty, -2)$ and strictly decreasing in $(-2, \infty)$			
	b) Strictly decreasing in $(-2,3)$			
	c) Strictly decreasing in $(-\infty, 3)$ and strictly increasing in $(3, \infty)$			
	d) Strictly decreasing in $(-\infty, -2) \cup (3, \infty)$			
27.	Simplest form of $\tan^{-1}\left(\frac{\sqrt{1+\cos x}+\sqrt{1-\cos x}}{\sqrt{1+\cos x}-\sqrt{1-\cos x}}\right)$ , $\pi < x < \frac{3\pi}{2}$ is:	1		
	a) $\frac{\pi}{4} - \frac{x}{2}$ b) $\frac{3\pi}{2} - \frac{x}{2}$			
	c) $-\frac{x}{2}$ d) $\pi -\frac{x}{2}$			
28.	Given that A is a non-singular matrix of order 3 such that $A^2 = 2A$ , then value of $ 2A $ is:			
	a) 4 b) 8			
	c) 64 d) 16			
	The value of <i>b</i> for which the function $f(x)$ and $y$ and $b$ is strictly	4		
29.	decreasing over <b>R</b> is: $x + cosx + b$ is strictly	I		
	a) $b < 1$ b) No value of b exists			
	C) $b \le 1$ C) $b \ge 1$			
30.	Let R be the relation in the set N given by $R = \{(a, b) : a = b - 2, b > 6\}$ , then:	1		
	a) $(2,4) \in \mathbb{R}$ b) $(3,8) \in \mathbb{R}$ c) $(6,8) \in \mathbb{R}$ d) $(8,7) \in \mathbb{R}$			
31.	The point(s), at which the function f given by $f(x) = \begin{cases} \frac{x}{ x }, x < 0 \end{cases}$	1		
	is continuous, is/are: $(-1, x \ge 0)$			
	a) $x \in \mathbb{R}$ b) $x = 0$			
	c) $x \in \mathbb{R} - \{0\}$ d) $x = -1$ and 1			
32.	If $A = \begin{bmatrix} 0 & 2 \end{bmatrix}$ and $kA = \begin{bmatrix} 0 & 3a \end{bmatrix}$ then the values of k a and h respectively.	1		
	are: $L_3 = 4J$ and $m = 12b = 24J$ , then the values of $n, n$ and $b$ respectively			

	a) -6, -12, -18	b) -6, -4, -9	
	c) -6, 4, 9	d) -6, 12, 18	
33.	A linear programming problem is as fo	llows:	1
	$Minimize \ Z = 30x + 50y$		
	subject to the constraints,		
	$3x + 5y \ge 15$		
	$2x + 3y \le 18$		
	$x \ge 0, y \ge 0$		
	In the feasible region, the minimum va	lue of Z occurs at	
	a) a unique point b)	no point	
	c) infinitely many points d)	two points only	
34	The area of a trapezium is defined by	function f and given by $f(x) = (10 \pm$	1
54.	The area of a trapezium is defined by $\sqrt{100 - w^2}$ then the area when it is	$\frac{10}{10} + \frac{10}{10} + 10$	1
	$x$ ) $\sqrt{100 - x^2}$ , then the area when it is i	naximised is:	
	a) $75cm^2$	b) $7\sqrt{2}cm^2$	
	$a) 75 \sqrt{2} \text{ cm}^2$	d) $5cm^2$	
	C) 7573Cm <sup>2</sup>	u) 30m	
35.	If A is square matrix such that $A^2 = A$ ,	then $(I + A)^3 - 7 A$ is equal to:	1
	a) A	b) I + A	
	<u> </u>	d) I	
36.	If $\tan^{-1} x = y$ , then:		1
	(2) - 1 < y < 1	b) $-\pi$ $\pi$	
	a) $-1 < y < 1$	$b)  \frac{1}{2} \leq y \leq \frac{1}{2}$	
	$\pi$ $\pi$ $\pi$	$e^{-\pi}\pi_{2}$	
	c) $\frac{1}{2} < y < \frac{1}{2}$	d) $y \in \{\frac{1}{2}, \frac{1}{2}\}$	
37.	Let A = {1, 2, 3}. B = {4, 5, 6, 7} and le	$f = \{(1, 4), (2, 5), (3, 6)\}$ be a function	1
••••	from A to B. Based on the given inform	nation, $f$ is best defined as:	
	0		
	a) Surjective function	b) Injective function	
	c) Bijective function	d) function	
38.	For A = $\begin{bmatrix} 3 & 1 \\ -2 & -2 \end{bmatrix}$ , then 14A <sup>-1</sup> is given b	y:	1
	L-1 2J <sup>2</sup> C		
	× [2 −1]		
	a) $[14[_{1} \ 3]$	b) [2 6]	
	r2 11	r 0 11	
	c) $2\begin{vmatrix} 2 & -1 \\ 1 & 2 \end{vmatrix}$	d) $2\begin{vmatrix} -3 & -1 \\ 1 & 2 \end{vmatrix}$	
39.	The point(s) on the curve $y = x^3 - 11x$	+ 5 at which the tangent is $y = x - 11$	1
	is/are:		
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		
40	$(1 C) (\pm 2, 19)$ 0	) (-2, 19) and (2, -9)	4
40.	Given that A = $\begin{vmatrix} \alpha & \rho \\ \gamma & -\alpha \end{vmatrix}$ and A <sup>2</sup> = 3I, the	en:	
	<u></u> [γ μ]		

	a) $1 + \alpha^2 + \beta \gamma = 0$ b) $1 - \alpha^2 - \beta \gamma = 0$ c) $3 - \alpha^2 - \beta \gamma = 0$ d) $3 + \alpha^2 + \beta \gamma = 0$	
	SECTION – C In this section, attempt any 8 questions. Each question is of 1-mark weightage. Questions 46-50 are based on a Case-Study.	
41.	For an objective function $Z = ax + by$ , where $a, b > 0$ ; the corner points of the feasible region determined by a set of constraints (linear inequalities) are (0, 20), (10, 10), (30, 30) and (0, 40). The condition on <i>a</i> and <i>b</i> such that the maximum Z occurs at both the points (30, 30) and (0, 40) is: a) $b - 3a = 0$ b) $a = 3b$ c) $a + 2b = 0$ d) $2a - b = 0$	1
42.	For which value of m is the line $y = mx + 1$ a tangent to the curve $y^2 = 4x$ ? a) $\frac{1}{2}$ b) 1         c) 2       d) 3	1
43.	The maximum value of $[x(x-1)+1]^{\frac{1}{3}}$ , $0 \le x \le 1$ is: (a) 0 (b) $\frac{1}{2}$ (c) 1 (d) $\sqrt[3]{\frac{1}{3}}$	1
44.	In a linear programming problem, the constraints on the decision variables x and y are $x - 3y \ge 0, y \ge 0, 0 \le x \le 3$ . The feasible region a) is not in the first quadrant b) is bounded in the first quadrant c) is unbounded in the first quadrant d) does not exist	1
45.	$Let A = \begin{bmatrix} 1 & \sin \alpha & 1 \\ -\sin \alpha & 1 & \sin \alpha \\ -1 & -\sin \alpha & 1 \end{bmatrix}, \text{ where } 0 \le \alpha \le 2\pi, \text{ then:}$ $\boxed{\begin{array}{c c} a \\ -1 \end{array}}$ $\boxed{\begin{array}{c c} a \\ -1 \end{array}}$ $\boxed{\begin{array}{c c} a \\ -1 \end{array}}$ $\boxed{\begin{array}{c c} b \\ -1 \end{array}}$ $\boxed{\begin{array}{c c} c \end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\hline \end{array}}$ $\boxed{\begin{array}{c c} c \end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\hline \end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\hline \end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\hline{\begin{array}{c c} c \end{array}}$ $\hline \end{array}}$ $\hline \end{array}$ $\begin{array}{c c} c \end{array}$ $\end{array}$ $\end{array}$ $\begin{array}{c c} c \end{array}$ $\end{array}$ $\end{array}$ $\end{array}$ $\end{array}$ $\end{array}$ $\end{array}$ $\end{array}$ $\end{array}$ $\end{array}$	1
	CASE STUDY         The fuel cost per hour for running a train is prototo to the square of the speed it generates in km per to the square of the speed it generates in km per the fuel costs ₹ 48 per hour at speed 16 km per and the fixed charges to run the train amount 1200 per hour.         Assume the speed of the train as <i>v</i> km/h.	oportional ber hour. If er hour to ₹

	Based on the given information, answer the following questions.				
46.	Given that the fuel cost per hour is $k$ times the square of the speed the train generates in km/h, the value of $k$ is:				1
	$ \begin{array}{c c}     a) & \frac{16}{3} \\     c) & 3 \end{array} $		b) $\frac{1}{3}$ d) $\frac{3}{16}$		
47.	If the train has travelled a distand the train is given by function:	ce of 50	00km, then the total cost o	of running	1
	a) $\frac{15}{16}v + \frac{600000}{v}$		b) $\frac{375}{4}v + \frac{600000}{v}$		
	c) $\frac{5}{16}v^2 + \frac{150000}{v}$		d) $\frac{3}{16}v + \frac{6000}{v}$		
48.	The most economical speed to ru	un the t	train is:		1
	a) 18km/h c) 80km/h	b) d)	5km/h 40km/h	-	
49.	The fuel cost for the train to trave	el 500k	m at the most economica	I speed is:	1
	a) ₹ 3750 c) ₹ 7500	b)	₹ 750 ₹ 75000	-	
50.	The total cost of the train to trave	el 500ki	m at the most economica	I speed is:	1
	a) ₹ 3750 c) ₹ 7500	b) d)	₹ 75000 ₹ 15000		

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### Subject Code - 241

### Sample Question Paper <u>CLASS: XII</u> Session: 2021-22 Applied Mathematics (Code-241) Term - 1

**Time Allowed: 90 minutes** 

Maximum Marks: 40

**General Instructions:** 

- 1. This question paper contains three sections A, B and C. Each part is compulsory.
- 2. Section A has 20 MCQs, attempt any 16 out of 20.
- 3. Section B has 20 MCQs, attempt any 16 out of 20
- 4. Section C has 10 MCQs, attempt any 8 out of 10.
- 5. There is no internal choice in any section.
- 6. All Questions carry equal Marks.

### <u>SECTION – A</u>

In this section, attempt any 16 questions out of Questions 1 – 20. Each Question is of 1 mark weightage.

1.	The value of $5 \odot_8 11$ , where $\odot$ is multiplication modulo is	1
	(a) -1 (b) 0 (c) 7 (d) 9	
2.	For two distinct positive numbers x and y	1
	(a) $x + y > 2\sqrt{xy}$ (b) $\frac{x+y}{2} > xy$ (c) $\sqrt{xy} > \frac{x+y}{2}$ (d) $\frac{2xy}{x+y} > \sqrt{xy}$	
3.	A person can row in still water at the rate of 8 km/h. If it takes him thrice as long to row	1
	upstream as to row downstream then the speed of the stream is:	
	(a) $2 \text{ km/h}$ (b) $3 \text{ km/h}$ (c) $4 \text{ km/h}$ (d) $6 \text{ km/h}$	
4.	If $x \equiv -4 \pmod{3}$ , then a solution for x is:	1
	(a) -2 (b) 12 (c) 19 (d) 35	
5.	If A is a square matrix of order 3 and $ A  = -2$ , then $ adj(A) $ is equal to	1
	(a) -8 (b) -2 (c) 0 (d) 4	
6.	In a 3 × 3 matrix A, value of $a_{12}c_{13} + a_{22}c_{23} + a_{32}c_{33}$ , where $c_{ij}$ is the cofactor of	1
	$a_{ij}$ is	
	(a) 0 (b) -1 (c) 1 (d) $ A $	
7.	If two square matrices A and B are such that $ AB  = 12$ and $ B  = -4$ , then value of	1
	<i>A</i>   is:	
	(a) 8 (b) -8 (c) -3 (d)16	
8.	If solving a system of linear equations in 3 variables by Cramer's rule, we get	1
	$\Delta = 0$ and at least one of $\Delta_x$ , $\Delta_y$ , $\Delta_z$ is non-zero then the system of linear equations has	
	(a) no solution (b) unique solution	
	(c) infinitely many solutions (d) trivial solution	

9.	The total cost function is given by $C(x) = x^2 + 30x + 1500$ . The marginal cost when	1
	10 units are produced is:	
	(a) $\notin 20$ (b) $\notin 30$ (c) $\notin 50$ (d) $\notin 70$	
10.	The function $y = \frac{1}{2}$ is strictly decreasing in the interval(s)	1
	(a) $(0,\infty)$ only (b) $(-\infty,0)$ only (c) $(-\infty,0)$ as well as $(0,\infty)$ (d) <b>R</b>	
11.	The equation of tangent to the curve $y = x^3 + x$ at the point (1, 2) is	1
	(a) $4x + y = 6$ (b) $4x - y = 2$ (c) $4x - y = 12$ (d) $4x + 3y = 7$	
12.	A Candidate claims 70% of the people in her constituency would vote for her. If 120000	1
	(a) 100000 (b) 84000 (c) 56000 (d) 36000	
13.	The total area under the normal distributed curve above the base line i.e. $\int_{0}^{\infty} f(x) dx$	1
	is	-
	(a) 0 (b) 0.5 (c) 0.75 (d) 1	
14.	Let X denotes the number of hours a student devotes to self-study during a randomly	1
	selected school day. The probability that X takes the value x, where $k$ is some	
	$ \begin{array}{c} \text{unknown constant is} \\ (k & \text{if } x = 0 \end{array} \end{array} $	
	$\int_{B} (x - x) = \int_{B} \frac{1}{kx} \qquad \text{if } x = 1 \text{ or } 2$	
	$P(x = x) = \begin{cases} k(5-x) & \text{if } x = 3 \text{ or } 4 \end{cases}$	
	The probability that a student studies at least 3 hours on a particular day is	
	The probability that a student studies at least 5 hours on a particular day is (a) $\frac{1}{2}$ (b) $\frac{2}{2}$ (c) $\frac{3}{2}$ (d) $\frac{1}{2}$	
	$\begin{pmatrix} a \end{pmatrix}_{7} \qquad \begin{pmatrix} b \end{pmatrix}_{7} \qquad \begin{pmatrix} b \end{pmatrix}_{7} \qquad \begin{pmatrix} b \end{pmatrix}_{2}$	
15.	An automatic machine produces 20000 pins per day. On rare occasion it produces a	1
	perfect pin whose chance is $\frac{1}{10000}$ . Assuming Poisson distribution, the mean and variance	
	of the number of perfect pins are respectively	
	(a) $\sqrt{2}$ , $\sqrt{2}$ (b) 2, 2 (c) 2, 4 (d) 4, 2	
16.	For a Poisson distribution with mean $\lambda \sum_{k=0}^{\infty} e^{-\lambda \lambda^{k}}$ is equal to	1
	(a) -1 (b) 0 (c) $\frac{1}{k!}$ (d) 1	
	(c) = (c)	
17.	A TV manufacturer tests a random sample of 6 picture tubes to determine any defect. Past	1
	experience suggests the probability of defective picture tube is 0.05. The probability that	
	there is at least one defective picture tube in the sample is $(18)^{6}$	
	(a) $\left(\frac{15}{20}\right)$ (b) $1 - \left(\frac{15}{20}\right)$ (c) $1 - \left[\left(\frac{15}{20}\right) + \frac{3}{10}\left(\frac{15}{20}\right)\right]$ (d) $\left(\frac{1}{20}\right)$	
18.	To calculate Laspeyres price index the weights are taken as	1
	(a) Base year prices (b) Current year prices (c) Pase year quantities (d) Current year quantities	
	(c) Base year quantities (d) Current year quantities	
19.	Given that $\sum p_1 q_1 = 506$ , $\sum p_0 q_0 = 406$ , $\sum p_1 q_0 = 456$ and $\sum p_0 q_1 = 451$ ,	1
	where subscript 0 and 1 are used for base year and current year respectively. The	
	Paasche sindex number is	
	(a) 112 19 (b) 112 31 (c) 117 31 (d) 108 52	

20.	Price index by Marshall Edgeworth method takes	1
	(a) $q_0$ as weights	
	(b) $q_1$ as weights	
	(c) $\frac{q_0 + q_1}{2}$ as weights	
	(d) $\sqrt{q_0}q_1$ as weights	
	$\frac{\text{SECTION} - B}{1000}$	
	In this section, attempt any 16 questions out of the Questions 21 - 40. Each Question is of 1-mark weightage	
21.	Two athletes Vijay and Samuel finish 100 meters race in 12 secs and 16 secs	1
	respectively. By how many meters does Vijay defeat Samuel?	
	(a) 10.2 meters (b) 15 meters (c) 25 meters (d) 35.5 meters	
22.	If the present time is 8.40 PM, then the time after $876^{-1}$ hours will be:	1
	$\begin{array}{c} \text{(a) } 8 \text{ 40 AM} \\ \text{(b) } 0 \text{ 10 AM} \\ \text{(c) } 6 \text{ 10 DM} \\ \text{(d) } 10 \text{ 40 DM} \\ \text{(d) } 10  40 D$	
	(a) 8.40 AM (b) 9.10 AM (c) 6.10 PM (d) 10.40 PM	
23.	A B and C enter into a partnership B contributes $\frac{1}{r}d$ of the capital while A	1
	$\frac{1}{3}$ contributes as much as B and C together contributes. The ratio of their capitals is:	
	(a) $1.2.3$ (b) $3.2.1$ (c) $3.1.1$ (d) $2.1.1$	
24.	Let $m \in Z^+$ consider the relation $R_m$ defined as $a R_m b$ iff $a \equiv b \pmod{m}$ , then $R_m$	1
	is	
	(a) reflexive but not symmetric (b) symmetric but not transitive	
25	(c) reflexive, symmetric but not transitive (d) an equivalence relation	1
20.	profit sharing ratio is 6:7:8 then the ratio of their investments is	I
	(a) $4:5:6$ (b) $9:7:6$ (c) $8:7:6$ (d) $12:21:32$	
26.	$\begin{bmatrix} a & b & -5 \\ b & a & b \end{bmatrix}$ is also provide the probability of the p	1
	If matrix $A = \begin{pmatrix} c & d & 0 \\ 5 & 0 & 0 \end{pmatrix}$ is skew symmetric, then value of $2a + b + c - 3a$ is:	
	(a) 1 (b) -1 (c) 0 (d) 2	
27.	In which of the technology matrix, Hawkins- Simon conditions are satisfied $(0.2, 0.0)$	1
	(a) $\begin{pmatrix} 0.2 & 0.9 \\ 0.8 & 0.1 \end{pmatrix}$ (b) $\begin{pmatrix} 0.7 & 0.3 \\ 0.2 & 1.2 \end{pmatrix}$	
	$(c) \begin{pmatrix} 1.02 & 0.5 \\ 0.6 & 0.2 \end{pmatrix} \qquad (d) \begin{pmatrix} 0.3 & 0.2 \\ 0.4 & 0.5 \end{pmatrix}$	
28.	The function $y =  x $ is	1
	(a) neither differentiable nor continuous at $x = 0$	
	(b) differentiable and continuous at $x = 0$	
	(c) continuous but not differentiable at $x = 0$ (d) differentiable but not continuous at $x = 0$	
00	(a) unrerentiable but not continuous at $x = 0$	
29.	Given that $x = at^2$ and $y = 2at$ , then value of $\frac{d^2y}{dx^2}$ is	1
	$(a) -\frac{1}{2at^3}$ $(b) -\frac{1}{2at^2}$ $(c) \frac{1}{t^2}$ $(d) \frac{-2a}{t}$	

30.	The variable cos fixed cost of ₹10	st of producin ),000, then th	g $x$ units is e level of or	$V(x) = x^2 +$ utput where the	2x. If the cose average cose	mpany incurs a st is minimum is	1
	(a) 10 units	(b) 50 u	nits	(c) 100 units	(d)	200 units	
31.	A sales promoti person buys one (a) -50	on company of the 10,000 (b) 0	sells tickets ) tickets sole	s for ₹100 each d, then his exp (c) 50	h to win a pr ected gain in (d)	ize of ₹5 lakhs. If a rupees is 100	1
32.	An insurance co accidents. The p for accidents is	ompany has fo probability tha	ound that 50 at a random	0% of its claim sample of 10	ns are for dan claims will	nages resulting from contain fewer than 2	n 1
	(a) $\frac{1}{1024}$	(b) $\frac{5}{512}$		$(c) \frac{11}{1024}$	(d)	<u>15</u> 1024	
33.	During a pander patients of a loca of patient getting	nic, 10% of t ality get infect g complicatio	he patients ted by the di ns is:	who have the isease, then the	disease get c standard dev	omplications. If 100 viation of the numbe	) 1 r
	(a) 10	(b) 9		(C) 6	(d)	3	
34.	An electrical sup is normally dist probability that (a) 0.1587	pplier distributed with the demand o (b) 0.34	itor has fou a mean of n a particula 413	nd the daily d f 432 and stat ar day exceeds (c) 0.7587	emand for flu ndard deviat 518 bulbs. (d)	orescent light bulb ion of 86. Find the 0.8413	5 1
35.	The value of mo ₹36 lacs and a s mortgage loan is (a) 85.26%	rtgage loans i standard devia s less than 54 (b) 93.3	nade by a co ation of ₹12 lacs is 32%	ertain bank is n 2 lacs. The pro (c) 97.42%	normally dist bability that (d)	ributed with mean o a randomly selected 98.04%	f 1 1
36.	The prices of gro	$\frac{1}{\Delta}$	odities is gi	ven in the follo	owing table:	D	1
	$\frac{p_0 \text{ [Price } (\mathbf{x})}{\text{ in 2019]}}$	40	28	120	0	112	
	$p_1 [Price (\mathbf{x}) \\ in 2020]$	50	35	13:	5	120	
	The price index (a) 88.23%	for 2020 taki (b) 113	ng 2019 as 1 .33%	base year using (c) 120.5%	g simple aggi (d)	regative method is: 136%	
37.	For data regardi method are 118. (a) 115.95	ng some com 4 and 117.5 r (b)117.	nmodities, the espectively. 95	he price index . The Fishers p (c) 120.84	es using Las rice index fo (d)	peyres and Paasche r the data is 121.45	5 1
38.	The price and qu	antities of ce	rtain comm	odities are sho	wn in the fol	lowing table:	1
		$p_0$	1	1			
		$q_0$	10	5			
		$p_1$	2	X			
	If notice of I	$q_1$	5	2		<b>29.27</b> (1	
	It ratio of Laspe	yres (L) and I	Paasches (P	) index numbe	r 1.e., L : P =	28:27, then the	
	(a) 2	(b) 3		(c) 4	(d)	5	

39.	To find the Index number by weighted average of price relatives, we use the formula	1
	(a) $\sum \left(\frac{p_1}{p_0}\right) (p_0 q_0) \times 100$ (b) $\sum p_1(p_0 q_0) \times 100$	
	(a) $\frac{1}{\Sigma(p_0 q_0)} \times 100$ (b) $\frac{1}{\Sigma(p_0 q_0)} \times 100$	
	(c) $\frac{\sum p_0(p_0 q_0)}{\sum p_0(p_0 q_0)} \times 100$ (d) $\frac{\sum {\binom{p_1}{p_0}}(p_1 q_1)}{\sum \binom{p_1}{p_0}} \times 100$	
	$(c)  \frac{1}{\Sigma(p_0 q_0)} \times 100 \qquad (d)  \frac{1}{\Sigma(p_1 q_1)} \times 100$	
40.	The Time reversal test is satisfied by	1
	(a) Laspeyres index only.	
	(b) Paasches index only	
	(c) Both Laspeyres and Paasches index numbers	
	(d) Fishers ideal index	
	$\frac{SECTION - C}{In this section attempt any 8 questions out 10 Questions}$	
	Fach question is of 1 mark weightage	
	(Questions 46-50 are based on a Case-Study).	
41.	A retailer buys 250 kg of rice, a part of which he sells at 10% profit and the remaining at	1
	5% loss. If the net profit made by the retailer in the whole transaction is 7%, then the	
	quantity of rice sold at 10% profit is	
	(a) 200 kg (b) 150 kg (c) 100 kg (d) 50 kg	
42.	Two pipes A and B can fill a cistern in 8 hours and 12 hours respectively. The pipes	1
	when opened simultaneously takes 12 minutes more to fill the cistern due to leakage.	
	Once the cistern is full, it will get emptied due to leakage in	
	(a) 5 hrs. (b) 20 hrs. (c) 60 hrs. (d) 120 hrs.	
43.	The demand function of a toy is, $x = 75 - 3p$ and its total cost function is	1
	TC = 100 + 3x. For maximum profit the value of x is	
	(a) 33 (b) 31 (c) 29 (d) 24	
44.	A river passing near a town floods it on an average twice every 10 years. Assuming	1
	Poisson distribution find the probability that the town faces flooding at least once in 10	
	years.	
	(a) $0.0198$ (b) $0.1353$ (c) $0.5657$ (d) $0.8647$	
45.	The height of certain species of plant is normally distributed with mean of 20 cm and	1
	standard deviation of 4 cm. what is the probability that the height of a plant chosen at	
	random lies between 10 cm and 30 cm $() 0.0076$ $() 0.0028$	
	(a) 0.0062  (b) 0.5341  (c) 0.9876  (d) 0.9938	
	CASE STUDY	
	The economy of a state is composed of various sectors. To understand the basic cond	ent we
	consider two sectors coal mining (sector 1) and utilities (sector 2). The coal mining produ	ces coal
	and utilities produces electricity. Assume that these products are measured by their rune	e value
	By one unit of product we mean 1 runee worth of that product. To produce $\gtrless1$ worth of	coal the
	by one unit of produce we mean 1 rupee worth of that produce. To produce $\forall 1$ worth of electricity. To produce $\forall 1$ worth of electricity.	ectricity
	the utilities sector uses $\gtrless 0.25$ of coal and $\gtrless 0.25$ of electricity	sourienty

	Based on the above information, answer the following questions:	
46.	The technology coefficient matrix A is	1
	(a) $\begin{pmatrix} 0.50 & 0.10 \\ 0.25 & 0.25 \end{pmatrix}$ (b) $\begin{pmatrix} 0.50 & 0.25 \\ 0.10 & 0.25 \end{pmatrix}$	
	(c) $\begin{pmatrix} 0.25 & 0.25 \\ 0.50 & 0.10 \end{pmatrix}$ (d) $\begin{pmatrix} 0.10 & 0.50 \\ 0.25 & 0.25 \end{pmatrix}$	
47.		1
	The matrix $(I - A)^{-1}$ is	
	(a) $\frac{1}{8} \begin{pmatrix} 15 & 5\\ 2 & 10 \end{pmatrix}$ (b) $\frac{1}{7} \begin{pmatrix} 15 & 2\\ 5 & 10 \end{pmatrix}$	
	(c) $\frac{1}{7} \begin{pmatrix} 15 & 5\\ 2 & 10 \end{pmatrix}$ (d) $\frac{20}{7} \begin{pmatrix} 0.75 & 0.25\\ 0.50 & 0.10 \end{pmatrix}$	
48.	The system is viable because (a) $ I - A  > 0$ and diagonal elements of $(I - A) < 0$ (b) $ I - A  > 0$ and diagonal elements of $(I - A) > 0$ (c) $ I - A  < 0$ and diagonal elements of $(I - A) > 0$ (d) $ I - A  < 0$ and diagonal elements of $(I - A) < 0$	1
49.		1
	If there is external demand worth ₹7000 of coal and ₹14000 of electricity, then production of two sectors to meet the demand is (a) ₹ 25000 of coal, ₹ 22000 of electricity (b) ₹ 12000 of coal, ₹ 20000 of electricity (c) ₹ 15000 of coal, ₹ 22000 of electricity (d) ₹ 27000 of coal, ₹ 22000 of electricity	
50.		1
	<ul> <li>How much worth of coal and electricity is used internally?</li> <li>(a) ₹ 25000 of coal, ₹22000 of electricity</li> <li>(b) ₹ 22000 of coal, ₹15000 of electricity</li> <li>(c) ₹ 20000 of coal, ₹10000 of electricity</li> <li>(d) ₹ 18000 of coal, ₹8000 of electricity</li> </ul>	

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### Sample Question Paper Class: XII Session: 2021-22 Computer Science (Code 083) (Theory: Term-1)

Maximum Marks: 35

**Time Allowed: 90 Minutes** 

**General Instructions:** 

- The question paper is divided into 3 Sections A, B and C.
- Section A, consist of 25 Questions (1-25). Attempt any 20 questions.
- Section B, consist of 24 Questions (26-49). Attempt any 20 questions.
- Section C, consist of 6 case study based Questions (50-55). Attempt any 5 questions.
- All questions carry equal marks.

Q.N.	Section-A		
	This section consists of 25 Questions (1 to 25). Attempt any 20 questions from this		
	section. Choose the best possible option.		
1	Find the invalid identifier from the following		
	a. none		
	b. address		
	c. Name		
	d. pass		
2	Consider a declaration $L = (1, Python', 3.14')$ .		
	Which of the following represents the data type of L?		
	a. list		
	b. tuple		
	c. dictionary		
	d. string		
3	Given a Tuple tup1= (10, 20, 30, 40, 50, 60, 70, 80, 90).		
	What will be the output of print (tup1 [3:7:2])?		
	a. (40,50,60,70,80)		
	b. (40,50,60,70)		
	c. [40,60]		
	d. (40,60)		
4	Which of the following option is not correct?		
	a. if we try to read a text file that does not exist, an error occurs.		
	b. if we try to read a text file that does not exist, the file gets created.		
	c. if we try to write on a text file that does not exist, no error occurs.		
	d. if we try to write on a text file that does not exist, the file gets		
	Created.		
5	Which of the following options can be used to read the first line of a text file Myfile.txt?		
	a. myfile = open('Myfile.txt');		
	b. myfile = open('Myfile.txt','r'); myfile.read(n)		
	c. myfile = open('Myfile.txt'); myfile.readline()		
	d. myfile = open('Myfile.txt');		

6	Assume that the position of the file pointer is at the beginning of 3rd line in a text file. Which
	of the following option can be used to read all the remaining lines?
	a. myfile.read()
	b. myfile.read(n)
	c. myfile.readline()
	d. myfile.readlines()
7	A text file student txt is stored in the storage device. Identify the correct option out of the
	following options to open the file in read mode.
	i. myfile = open('student.txt','rb')
	ii. myfile = open('student.txt','w')
	iii. myfile = open('student.txt','r')
	iv. myfile = open('student.txt')
	,
	a. only i
	b. both i and iv
	c. both iii and iv
	d. both i and iii
8	The return type of the input() function is
	a. string
	b. integer
	c. list
	d. tuple
9	Which of the following operator cannot be used with string data type?
	a. +
	b. in
	c. *
	d. /
10	Consider a tuple tup1 = (10, 15, 25, and 30). Identify the statement that will result in an
	error.
	a. print(tup1[2])
	b. tup1[2] = 20
	c. print(min(tup1))
	d. print(len(tup1))
11	Which of the following statement is incorrect in the context of binary files?
	a. Information is stored in the same format in which the information is held in
	memory.
	b. No character translation takes place
	c. Every line ends with a new line character
	d. pickle module is used for reading and writing
12	What is the significance of the tell() method?
	a. tells the path of file
	b. tells the current position of the file pointer within the file
	c. tells the end position within the file
	d. checks the existence of a file at the desired location

13	Which of the following statement is true?
	a. pickling creates an object from a sequence of bytes
	b. pickling is used for object serialization
	c. pickling is used for object deserialization
	d, pickling is used to manage all types of files in Python
14	Syntax of seek function in Python is myfile.seek(offset, reference_point) where myfile is
	the file object. What is the default value of reference_point?
	a. 0
	b. 1
	c. 2
	d. 3
15	Which of the following components are part of a function header in Python?
	a. Function Name
	b. Return Statement
	c. Parameter List
	d. Both a and c
16	Which of the following function header is correct?
	a. def cal_si(p=100, r, t=2)
	b. def cal_si(p=100, r=8, t)
	c. def cal_si(p, r=8, t)
	d. def cal_si(p, r=8, t=2)
17	Which of the following is the correct way to call a function?
	a. my_func()
	b. def my_func()
	c. return my_func
	d. call my_func()
18	Which of the following character acts as default delimiter in a csv file?
	a. (colon) :
	b. (hyphen) -
	c. (comma) ,
	d. (vertical line)
19	Syntax for opening Student.csv file in write mode is
	myfile = open("Student.csv","w",newline=").
	What is the importance of neutline, "2
	A nowline gets added to the file
	a. A newline gets added to the first line
	b. Empty string gets appended to the first line.
	d EQL translation is suppressed
20	What is the correct expansion of CSV/ files?
20	a Comma Sonarable Values
	a. Comma Separated Values
	o. Comma Split Values
	d. Commo Separation Values
	a. Comma Separation values

21	Which of the following is not a function / method of csv module in Python?
	a. read()
	b. reader()
	c. writer()
	d. writerow()
22	Which one of the following is the default extension of a Python file?
	aexe
	bp++
	cpy
	dp
23	Which of the following symbol is used in Python for single line comment?
	a. /
	b. /*
	c. //
	d. #
24	Which of the following statement opens a binary file record.bin in write mode and writes
	data from a list lst1 = [1,2,3,4] on the binary file?
	a. with open('record.bin','wb') as myfile:
	pickle.dump(lst1,myfile)
	b. with open('record.bin','wb') as myfile:
	pickle.dump(myfile,lst1)
	c. with open('record.bin','wb+') as myfile:
	pickle.dump(myfile,lst1)
	d. with open('record.bin','ab') as myfile:
	pickle.dump(myfile,lst1)
25	Which of these about a dictionary is false?
	<ul> <li>a) The values of a dictionary can be accessed using keys</li> </ul>
	<ul><li>b) The keys of a dictionary can be accessed using values</li></ul>
	c) Dictionaries aren't ordered
	d) Dictionaries are mutable
	Section-B
	This section consists of 24 Questions (26 to 49). Attempt any 20 questions.
26	What is the output of following code:
	T = (100)
	print(T*2)
	a. Syntax error
	b. (200,)
	c. 200
	d. (100,100)

27	Suppose content of 'Myfile.txt' is:
	Twinkle twinkle little star
	How I wonder what you are
	Up above the world so high
	Like a diamond in the sky
	Whet will be the extent of the following and 0
	what will be the output of the following code?
	<pre>myrrre = Open( Myrrre.txt ) data = myfile readlines()</pre>
	print(len(data))
	mvfile.close()
	a. 3
	b. 4
	c. 5
	d. 6
28	Identify the output of the following Python statements.
	x = [[10.0, 11.0, 12.0], [13.0, 14.0, 15.0]]
	y = x[1][2]
	print (y)
	a. 12.0
	D. 13.0
	d. 15.0
29	Identify the output of the following Python statements.
	x = 2
	while $x < 9$ :
	y = x + 1
	a. 12345678
	b. 123456789
	c. 2345678
	d. 23456789
30	Identify the output of the following Python statements.
	b = 1
	for a in range(1, 10, 2):
	b += a + 2
	print(b)
	a. 31 b. 33
	c. 36
	d. 39



	a. jump
	b. break
	c. continue
	d. return
34	What will be the output of the following Python code?
	<pre>def add (num1, num2):</pre>
	sum = num1 + num2
	sum = add(20, 30)
	print(sum)
	a. 50
	b. 0
	c. Null
	d. None
35	Evaluate the following expression and identify the correct answer.
	16 - (4 + 2) * 5 + 2**3 * 4
	a. 54
	b. 46
	c. 18
	d. 32
36	What will be the output of the following code?
	<pre>def my_func(var1=100, var2=200):</pre>
	var1+=10
	var2 = var2 - 10
	return var1+var2
	<pre>print(my_func(50),my_func())</pre>
	a. 100 200
	b. 150 300
	c. 250 75
	d. 250 300
37	What will be the output of the following code?
	value = 50
	def display(N):
	global value
	value = 25
	11 N%/==0:
	value = value + N
	else:
	Value = Value - N
	print(Value, end="#")
	arspray(20)
	2 50#50
	a. 50#50 h 50#5
	c 50#3
	d 5#50#
	u. J#JU#

38	What will be the output of the following code?
	import random
	List=["Delhi","Mumbai","Chennai","Kolkata"]
	for y in range(4):
	x = random.randint(1,3)
	<pre>print(List[x],end="#")</pre>
	a. Delhi#Mumbai#Chennai#Kolkata#
	b. Mumbai#Chennai#Kolkata#Mumbai#
	c. Mumbai# Mumbai #Mumbai # Delhi#
	d. Mumbai# Mumbai #Chennai # Mumbai
39	What is the output of the following code snippet?
	def ChangeVal(M,N):
	for i in range(N):
	if M[i]%5 == 0:
	M[i]//=5
	if M[i]%3 == 0:
	M[i]//=3
	L = [25, 8, 75, 12]
	ChangeVal(L,4)
	for i in L:
	<pre>print(i,end="#")</pre>
	a) 5#8#15#4#
	b) 5#8#5#4#
	c) 5#8#15#14#
	d) 5#18#15#4#
10	Suppose content of Mufile tut is
40	Suppose content of Mylle.txt is
	Humpty Dumpty sat on a wall
	All the kingle barges and ell the kingle man
	All the king's norses and all the king's men
	Couldn't put Humpty together again
	what will be the output of the following code?
	<pre>myfile = open("Myfile.txt")</pre>
	record = myfile.read().split()
	print (len (record))
	myfile.close()
	a. 24
	b. 25
	C. 26
4.4	
41	Find the output of the following code:
	Name="PythoN3.1"
	R=""
	IOT X IN FANGe (IEN (Name)):
	<pre>if Name[x].isupper():</pre>

	elif Name[x].islower():		
	R=R+Name[x].upper()		
	<pre>elif Name[x].isdigit():</pre>		
	R=R+Name[x-1]		
	else:		
	R=R+"#"		
	print(R)		
	a. pYTHOn##@		
	b. pYTHOnN#@		
	c. pYTHOn#@		
	d. pYTHOnN@#		
42	Suppose content of 'Myfile.txt' is		
	Honesty is the best policy.		
	What will be the output of the following code?		
	<pre>myfile = open("Myfile.txt")</pre>		
	x = myfile.read()		
	print(len(x))		
	myfile.close()		
	a. 5		
	b. 25		
	c. 26		
	d. 27		
43	Suppose content of 'Myfile.txt' is		
	Culture is the widening of the mind and of the spirit.		
	What will be the output of the following code?		
	<pre>myfile = open("Myfile.txt")</pre>		
	x = myfile.read()		
	y = x.count('the')		
	print(y)		
	myfile.close()		
	a. 2		
	b. 3		
	c. 4		
	d. 5		
44	What will be the output of the following code?		
	x = 3		
	<pre>def myfunc():</pre>		
	global x		
	x+=2		
	<pre>print(x, end=' ')</pre>		
	<pre>print(x, end=' ')</pre>		
	myfunc()		
	<pre>print(x, end=' ')</pre>		

	a. 3 3 3		
	b. 3 4 5		
	c. 3 3 5		
	d. 3 5 5		
45	Suppose content of 'Myfile.txt' is		
	Ek Bharat Shreshtha Bharat		
	What will be the output of the following code?		
	mvfile = open("Mvfile.txt")		
	vlist = list("aeiouAEIOU")		
	vc=0		
	<pre>x = myfile.read()</pre>		
	for y in x:		
	if(y in vlist):		
	vc+=1		
	print(vc)		
	myfile.close()		
	a. 6		
	b. 7		
	c. 8		
	d. 9		
46	Suppose content of 'Myfile.txt' is		
	Twinkle twinkle little star		
	How I wonder what you are		
	Up above the world so high		
	Like a diamond in the sky		
	Twinkle twinkle little star		
	What will be the output of the following code?		
	<pre>myfile = open("Myfile.txt")</pre>		
	line_count = 0		
	<pre>data = myfile.readlines()</pre>		
	for line in data:		
	if line[0] == 'T':		
	line_count += 1		
	print(line_count)		
	<pre>myfile.close()</pre>		
	a. 2		
	b. 3		
	C. 4		
	d. 5		
1			



	S	Section-C		
	Case Study based Questions			
	This section consists of 6 Questions (50 -55) Attempt any 5 questions.			
	Rohit, a student of class 12, is learning CSV File Module in Python. During examination, he has been assigned an incomplete python code (shown below) to create a CSV File 'Student.csv' (content shown below). Help him in completing the code which creates the desired CSV File.			
	<b>CSV</b> 1,AKS 2,ABH 3,ARV 4,RAV 5,ASH	File SHAY,XII,A HISHEK,XII,A /IND,XII,A /I,XII,A HISH,XII,A		
	Incomplete Code			
	import fh = open(,, newline='') stuwriter = csv.	#Statement-1 #Statement-2 #Statement-3		
	data = [] header = ['ROLL_NO', 'NAME', 'CLASS', 'SECTION'] data.append(header) for i in range(5): roll_no = int(input("Enter Roll Number : ")) name = input("Enter Name : ")			
	Class = Input("Enter Class : ") section = input("Enter Section : ")	#Statement-4		
	data.append() stuwriter (data) fh.close()	#Statement-5 #Statement-6		
50	Identify the suitable code for blank space	e in the line marked as Statement-1.		
	a) csv file b) CSV c) csv d) cvs			
51	Identify the missing code for blank space	e in line marked as Statement-2.		
	a) "Student.csv","wb" b) "Student.csv","w" c) "Student.csv","r" d) "Student.cvs","r"			
52	Choose the function name (with argume	nt) that should be used in the blank space of line		
	a) reader(fh) b) reader(MyFile) c) writer(fh) d) writer(MyFile)			

53	Identify the suitable code for blank space in line marked as Statement-4.
	a) 'ROLL_NO'. 'NAME'. 'CLASS'. 'SECTION'
	b) ROLL_NO, NAME, CLASS, SECTION
	c) 'roll_no','name','Class','section'
	d) roll_no,name,Class,section
E A	Identify the quitchle code for blank and as in the line marked as Statement E
54	identify the suitable code for blank space in the line marked as Statement-5.
	a) data
	b) record
	c) rec
	d) insert
55	Choose the function name that should be used in the blank space of line marked as
	Statement-6 to create the desired CSV File?
	a) dump()
	b) load()
	c) writerows()
	d) writerow()